

Serial No. 10/620,910

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REMARKS**I. PRELIMINARY REMARKS**

Minor modifications have been made to the specification. Claims 1-3, 5, 6, 8, 11-13 and 19 have been amended. Claim 20 has been canceled. Claim 43 has been added. Claims 1-19, 21-23 and 43 remain in the application. Claims 3, 4 and 17 have been withdrawn from consideration. Reexamination and reconsideration of the application, as amended, are respectfully requested.

II. FORMALISTIC ISSUES**A. The Objection to the Specification**

The specification has been objected to. Applicant respectfully submits that the minor, typographical errors associated with reference numerals 150, 152 and 154 have been corrected by the amendment above and that the objection should be withdrawn.

B. The Means-Plus-Function Element in Claim 19

The Office Action indicated that claim 19 has not been interpreted as invoking 35 U.S.C. § 112, sixth paragraph, for the two reasons discussed below. The Examiner's claim interpretation is hereby traversed because the specification and claims are in full compliance with the applicable statute and rules. Reconsideration thereof is respectfully requested.

With respect to the first reason for the claim interpretation presented in the Office Action, i.e. that the specification does not refer to a "means plus function" structure, it is not entirely clear from the Office Action exactly which aspect of the statute and/or rules that the specification purportedly failed to comply with. Applicant has assumed for the purposes of this response that the Office Action intended to raise a "written description

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support for a 35 U.S.C. § 112, sixth paragraph, limitation" issue.¹ To that end, MPEP § 2181-II indicates that the proper test for "written description support for a 35 U.S.C. § 112, sixth paragraph, limitation" is whether or not "the corresponding structure (or material or acts) of a means (or step)-plus-function limitation must be disclosed in the specification itself in a way that one skilled in the art will understand what structure (or material or acts) will perform the recited function." *Citations omitted.*

The present specification meets the standard set forth in MPEP § 2181-II. The functional statement of the means-plus-element in claim 19 is "converting reactants into electricity and byproducts and directing the reactants and byproducts from the outer region to the inner region, and at least once around the perimeter of the inner region, as the reactants are being converted into electricity and byproducts." In the exemplary embodiments presented in the specification, the claimed function is performed by fuel cells 114/116, fuel cell 114a, and fuel cells 114c/116c. Moreover, *the specification uses essentially the same language as claim 19* to describe the function performed by these structures. For example, the specification includes the following passage at page 5, lines 9-14:

Referring more specifically to Figures 4 and 5, the fuel cells 114 and 116 are arranged such that the fuel, oxidant and reaction byproducts travel from the outer region of the fuel cell assembly 100 to the inner region of the assembly, and complete one or more revolutions around the perimeter of the inner region of the assembly, as they travel through the fuel and oxidant passages 134 and 136 from the fuel and oxidant inlets 108 and 110 to the byproduct outlet tube 128.

The specification also includes the following passage at page 7, line 31 to page 8, line 9:

Here, however, the fuel cell assembly includes a single fuel cell 114a that is arranged in such a manner that portions the anode 118 (Figure 12) face one another (or face a portion of the housing main wall 104) with fuel passages 134 defined therebetween, while portions of the cathode 120 (Figure 12) face one another (or face a portion of the housing main wall) with oxidant passages 136 defined therebetween. The fuel, oxidant and reaction byproducts will travel from the outer region of the fuel cell

¹ Should applicant's assumption be incorrect, applicant hereby requests that the next Office Action clearly specify which aspects of the statute and rules have not been complied with.

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assembly 100a to the inner region of the assembly, and complete one or more revolutions around the inner region of the assembly, as they travel through the fuel and oxidant passages 134 and 136 from the fuel and oxidant inlets 108 and 110 to the inner region of the assembly.

With respect to fuel cells 114c/116c, the specification indicates that the fuel cell sheets 138c and 140c (which become fuel cells 114c/116c) are positioned in a manner similar to that illustrated in Figure 4. [Specification at page 10, lines 26-30.] One of skill in the art would, therefore, recognize that fuel cells 114c/116c will perform the claimed function in the same manner as fuel cells 114/116. Thus, one of skill in the art, who had reviewed the specification, would "understand what structure ... will perform the recited function" in the means-plus-element in claim 19.

With respect to the second reason for the claim interpretation presented in the Office Action, i.e. structural recitation, claim 19 does not recite any structure whatsoever *for performing the claimed function*. The only structure referred to in the mean-plus-function element are aspects of the housing that are used to define the direction and manner of reactant travel caused by the claimed means.²

As illustrated above, the claim interpretation used to evaluate claim 19 was improper. Applicant hereby requests that claim 19 be re-evaluated in accordance with 35 U.S.C. § 112, sixth paragraph, in a supplemental, non-final Office Action.

C. The Rejection Under 35 U.S.C. § 112, First Paragraph

Claims 14-16 and 18 have been rejected under 35 U.S.C. § 112, first paragraph, as purportedly failing to enable a "fuel cell comprising an exhaust region defining a perimeter." The rejection is respectfully traversed. Reconsideration thereof is respectfully requested.

At the outset, applicant notes that although the specification does not include the exact phrase "exhaust region," the "claimed subject matter need not be described *in haec*

² The Office Action failed to identify the purportedly improper structure in the means-plus-function element. Accordingly, applicant hereby requests that the next Office Action clearly indicate which *function performing* structure is recited in the means-plus-function element in claim 19 in order to clarify the issues in this application.

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verba in the specification in order for that specification to satisfy the description requirement." *In re Smith and Hubin*, 178 USPQ 620, 624 (CCPA 1973). Rather, applicant need only convey to those skilled in the art that, as of the filing date sought, he or she was in possession of the claimed invention. "One does that by such descriptive means as words, structures, figures, diagrams, formulas, etc., that fully set forth the claimed invention." *Lockwood v. American Airlines, Inc.*, 41 USPQ2d 1961, 1966 (Fed. Cir. 1997).

In the present application, a skilled artisan would certainly understand that the "exhaust" is byproduct and unused reactant. [See, e.g., page 4, lines 9-12.] A skilled artisan would also understand which region of the exemplary fuel cells is the region that the "at least one anode and cathode arrangement having a spiral shape [extend] more than once around the perimeter of." [Note the other clause in claim 14.] A skilled artisan would also recognize the region associated with the outlet end of the "reactant path." [*Id.*] With respect to the embodiment illustrated in Figure 4, for example, such an "exhaust region" is the region occupied in part by the exhaust tube 128. Similarly, in the embodiment illustrated in Figure 10, the such an "exhaust region" is the region occupied by the byproduct outlet regions 128a and 128b.

As illustrated above, one of skill in the art who had reviewed the present specification would have understood that a "fuel cell comprising an exhaust region defining a perimeter" was disclosed therein. Thus, the rejection under 35 U.S.C. § 112, first paragraph, is improper and should be withdrawn.

D. The Rejection Under 35 U.S.C. § 112, Second Paragraph

Claims 14-16 and 18 have been rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The rejection is respectfully traversed. Reconsideration thereof is respectfully requested.

Given the fact that the "heat exchanger" mentioned in the Office Action is not even recited in claims 14-16 and 18, applicant has no idea what the purported deficiency in claims 14-16 and 18 is supposed to be. Claims 14-16 and 18 are directed

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to a fuel cell having certain attributes and one of ordinary skill in the art would have no difficulty whatsoever determining what those attributes are. As such, the rejection under 35 U.S.C. § 112, second paragraph, is improper and should be withdrawn.

Turning to the claim 13, the Office Action has apparently objected to the use of term "substantially" in the phrase "substantially curvilinear spiral shape." Applicant respectfully notes that the term "substantially" is commonly used in patent claims to describe situations where there may be some degree of variation. See *Andrew Corp. v. Gabriel Electronics Inc.*, 6 USPQ2d 2010, 2012 (Fed. Cir. 1988) (terms such as substantially "are ubiquitous in patent claims" and "have been accepted in patent examination and upheld by the courts") as well as MPEP § 2173.05(b). The descriptive term "substantially" has been used in claim 13 to describe a situation where there may be some degree of variation, i.e. where the "reactant path" either has a perfectly "curvilinear spiral shape" or has a shape that is somewhat close to a perfectly "curvilinear spiral." There is, therefore, no question that the phrase "substantially curvilinear spiral shape" particularly points out and distinctly claims this aspect of applicant's invention. The rejection under 35 U.S.C. § 112, second paragraph, is accordingly improper and should be withdrawn.

III. PRIOR ART REJECTION OF CLAIMS 1, 2, 5-13 AND 19-23

A. The Rejections

Claims 1, 2, 5-7, 9-12 and 19-23 have been rejected under 35 U.S.C. § 102 as being anticipated by U.S. Patent No. 6,063,517 to Montemayor et al. ("the Montemayor '517 patent"). Claims 8 and 13 have been rejected under 35 U.S.C. § 103 as being unpatentable over the Montemayor '517 patent. Claims 10 and 21 have also been rejected under 35 U.S.C. § 103 as being unpatentable over the combined teachings of the Montemayor '517 patent and U.S. Patent Pub. No. 2003/0011721 to Wattelet et al.

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(“the Wattelet ‘721 publication”).³ The rejections under 35 U.S.C. §§ 102 and 103 are respectfully traversed with respect to the claims as amended above. Reconsideration thereof is respectfully requested.

B. The Cited References

As illustrated in Figure 1, the Montemayor ‘517 patent discloses a fuel cell apparatus including a fuel cell with an anode 14 and hydrogen injection tubes 22 and 24 at the longitudinal edges of the anode. The fuel cell is rolled in the manner illustrated in Figure 2 and placed in the casing 30 illustrated in Figure 3. During operation, hydrogen is forced into both longitudinal ends of the anode 14 by way of the hydrogen injection tubes 22 and 24 under sufficient pressure to force the hydrogen through the anode. [Note arrows 34 in Figure 3.] Oxidant is supplied to the rolled fuel cell by way of the gaps adjacent to the cathode 26. Additionally, and although it is not entirely clear, it appears that hydrogen which was not forced into the anode 14 exits the apparatus by way of the injection tubes 22 and 24. [Note the arrows at the bottom of Figure 3.]

The Wattelet publication has been cited for its purported heat exchanger teachings.

C. Discussion Concerning 1, 2 and 5-13

Independent claim 1 is directed to a combination of elements comprising “a housing having an outer region and an inner region defining a perimeter” and “at least one fuel cell, including an anode and a cathode, shaped to define a ***fuel path adjacent to the anode which extends at least once around the perimeter*** of the inner region and has an upstream end associated with the outer region and a downstream end associated with the inner region.” The respective combinations defined by claims 2 and 5-13 include, *inter alia*, the elements recited in claim 1.

³ Claims 10 and 21 were also rejected under 35 U.S.C. § 102. Applicant hereby requests that the next Office Action indicate whether or not this was a typographical error.

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The Montemayor '517 patent fails to teach or suggest the claimed combinations. For example, there is no fuel path adjacent to the anode 14 in the Montemayor apparatus. Hydrogen is supplied under pressure and forced into, and through, the anode 14. In other words, the Montemayor anode 14 is itself the fuel path.

As the Montemayor '517 patent fails to teach or suggest each and every element of the combination recited in independent claim 1, applicant respectfully submits that claims 1, 2, 5-7 and 9-12 are patentable thereover and that the rejection under 35 U.S.C. § 102 should be withdrawn.

Turning to claims 8 and 13, applicant respectfully submits that the Montemayor '517 patent also fails to render independent claim 1 obvious and that claims 8 and 13 are patentable over the Montemayor '517 patent for at least the same reasons as independent claim 1. The rejection of claims 8 and 13 under 35 U.S.C. § 103 should, therefore, be withdrawn.

Finally, with respect to claim 10, the Wattelet '721 publication fails to remedy the above-identified deficiencies in the Montemayor '517 patent. Claim 10 is, therefore, patentable for at least the same reasons as independent claim 1 and the rejection of claim 10 under 35 U.S.C. § 103 should also be withdrawn.

D. Discussion Concerning 19-23

Independent claim 19 is directed to a combination of elements comprising "a housing having an outer region, an inner region defining a perimeter and exhaust port connected to the inner region" and "**means for** converting reactants into electricity and byproducts and directing the reactants and byproducts from the outer region to the inner region, and at least once around the perimeter of the inner region, as the reactants are being converted into electricity and byproducts **such that all of the byproducts and any unused reactants that exit the fuel cell assembly exit by way of the inner region.**" The respective combinations defined by claims 20-23 include, *inter alia*, the elements recited in claim 19.

The Montemayor '517 patent fails to teach or suggest the claimed combinations. For example, the function recited in the means-plus-function element is not being

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performed because what appears to be unused hydrogen exits the Montemayor apparatus from the *outer region (tube 24)* in addition to the inner region (tube 22).

As the Montemayor '517 patent fails to teach or suggest each and every element of the combination recited in independent claim 19, applicant respectfully submits that claims 19-23 are patentable thereover and that the rejection under 35 U.S.C. § 102 should be withdrawn.

Turning to claim 21, the Wattelet '721 publication fails to remedy the above-identified deficiencies in the Montemayor '517 patent. Claim 21 is, therefore, patentable for at least the same reasons as independent claim 19 and the rejection of claim 21 under 35 U.S.C. § 103 should also be withdrawn.

IV. PRIOR ART REJECTION OF CLAIMS 14-16 AND 18

A. The Rejection

Claims 14-16 and 18 have been rejected under 35 U.S.C. § 103 as being unpatentable over the combined teachings of U.S. Patent No. 4,910,100 to Nakanishi et al. ("the Nakanishi '100 patent") and the Montemayor '517 patent. The rejection under 35 U.S.C. § 103 is respectfully traversed. Reconsideration thereof is respectfully requested.

B. The Cited References

Referring to Figures 6A and 6B, the Nakanishi '100 patent discloses a fuel cell stack including a plurality of spaced fuel cells 13 with spiral guide vanes 4B therebetween. Fuel and oxidant are supplied to the fuel cells 13 at the inner ends of the guide vanes 4B by the fuel and oxidant manifolds 5 and 6. The fuel and oxidant is discharged at the outer ends of the guide vanes 4B.

The Montemayor '517 patent disclose a fuel cell apparatus including a fuel cell with an anode 14 and hydrogen injection tubes 22 and 24. Hydrogen is forced into the inner and outer ends of the anode 14. [Note arrows 34 in Figure 3.] Although it is not entirely clear, it appears that hydrogen which was not forced into the anode 14 exits the fuel cell

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apparatus by way of the injection tubes 22 and 24. [Note the arrows at the bottom of Figure 3.]

C. Discussion Concerning Claims 14-16 and 18

Independent claim 14 calls for a combination of elements comprising "an exhaust region defining a perimeter" and "at least one anode and cathode arrangement having a spiral shape that **extends more than once around the perimeter of the exhaust region** and defines a reactant path having an **outlet end associated with the exhaust region** and an inlet end." The respective combinations defined by claims 15, 16 and 18 include, *inter alia*, the elements recited in claim 14.

The cited references fail to teach or suggest the claimed combinations. For example, the fuel and oxidant **enters** the spiral guide vanes 4B (from the manifolds 5 and 6) **in the center** of the Nakanishi fuel cell stack and **exits at the outermost edge**. As such, even assuming for the sake of argument that there was some reason to substitute the Montemayor spiral fuel cell for the fuel Nakanishi fuel cells 13 and guide vanes 4B, the spirally shaped fuel cell would not extend "more than once around the perimeter of the exhaust region." The purportedly obvious spirally shaped fuel cell would, to the contrary, extend more than once about the **reactant inlet region** (i.e. the fuel and oxidant manifolds 5 and 6).

As the Nakanishi and Montemayor '517 patents fail to teach or suggest the combination of elements recited in independent claim 14, whether viewed alone or in combination, applicant respectfully submits that the rejection of claims 14-16 and 18 under 35 U.S.C. § 103 should be withdrawn.

V. CLOSING REMARKS

In view of the foregoing, it is respectfully submitted that the claims in the application are in condition for allowance. Reexamination and reconsideration of the application, as amended, are respectfully requested. Allowance of the claims at an early date is courteously solicited.

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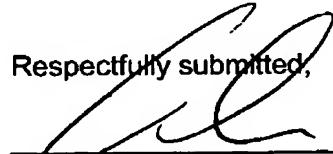
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If for any reason the Examiner finds the application other than in condition for allowance, the Examiner is respectfully requested to call applicant's undersigned representative at (310) 563-1458 to discuss the steps necessary for placing the application in condition for allowance.

The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 08-2025. Should such fees be associated with an extension of time, applicant respectfully requests that this paper be considered a petition therefor.

3/21/06
Date

Respectfully submitted,



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